

## A CURIOUS THELYPTEROID FERN

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### SUMMARY

A new combination under *Goniopteris* is established for the rare Thelypteroid fern from Central America originally described as *Aspidium cumingianum* Kze.

When looking through material of the *Polypodiaceae* (s. str.) now being investigated under the collaboration of the Universities of Leiden, Utrecht and Kalyani, the authors were struck by a specimen in the Leiden Herbarium identified as '*Polypodium falcoideum* Kuhn', whereas in actual fact, looking at it closely, this plant was recognised to be a thelypteroid fern, allied to the *Goniopteris* group.

Details of the label were as follows:

Plants of Panama, Prov. of Canal Zone.

Pipeline road. Rio Agua Salud.

Terrestrial, growing on moist, almost vertical stream bank.

Leg. *Helen Kennedy and Robin Andrews* (N°) 1884

1 Nov. 1972.

Distributed by the Missouri Bot. Garden Herb. (MO).

On the sheet were six plants; the specimens were received from MO. in exchange.

Prof. R. E. Holttum at Kew confirmed the thelypterid affinity of this fern. He identified it as *Dryopteris cumingiana* (Kze) O. Kuntze (1891), adding that no combination under *Goniopteris* (or *Thelypteris*) had been made since. The basionym was published by Kunze under *Aspidium* in the Supplement to Schkur's Farnkräuter with a detailed description and beautiful plate. J. Smith transferred it to *Nephrodium* and illustrated it again. Christensen in the Index and his well-known monograph of the American species of the Genera *Dryopteris* followed O. Kuntze in using *Dryopteris* in a very broad sense including *Thelypteris* s.l., now considered unnatural. But Christensen clearly recognised the relationship to the subgenus *Goniopteris* [section *Asterochlaena*] remarking that he firmly believed *Goniopteris* to be 'a very natural genus' and not clearly related to other groups in '*Dryopteris*', apart from the subgenus *Meniscium*. Holttum now commented that this fern should be placed in the genus *Goniopteris*. This will be done here, although it is realised that other students of this group would prefer an inclusion in a comprehensive genus *Thelypteris*.

Christensen remarked that this species 'appears to be rare, which is not found in the large recent collections of Panama' and it is, therefore, thought useful to repeat

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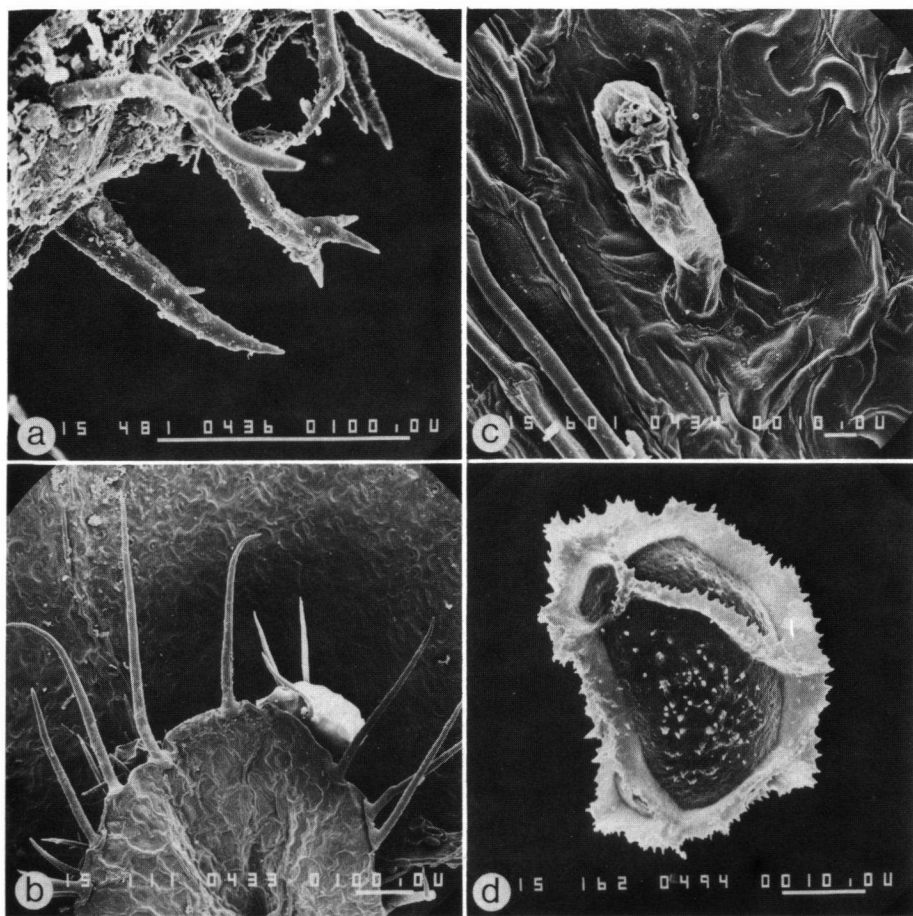


Plate I. *Goniopteris cumingiana*. — a. acicular and unicellular branched hairs on petiole; b. indusium with marginal acicular hairs partly covering a sporangium with acicular hairs on its jacket cells; c. foliar glandular hair; d. spore. (micromarker: a and b, 100  $\mu$ ; c and d, 10  $\mu$ ).

its nomenclatural history and a full description, especially of some anatomical and palynological features hitherto unpublished:

***Goniopteris cumingiana* (Kunze) de Joncheere & Sen, *comb. nov.* — Fig. 1, Pl. I**

*Aspidium cumingianum* G. Kunze, Suppl. Schkur's Farnkräuter (1840) 17, t. 9, f. 2; G. Mettenius, Farngett. 4 (1858) 234; W. J. Hooker & J. G. Baker, Syn. Fil. (1867) 287. — *Nephrodium cumingianum* J. Smith, Bot. Voy. 'Herald' Fil. Mex. & Pan. (1854) 237, t. 50; H. Christ., Farnkr Erde (1897) 244. — *Dryopteris cumingiana* O.K., Rev. Gen. Fl. 2 (1891) 812; C. Christensen, Ind. Fil. (1906) 260; Mon. Dryopteris 1 (1913) 208 (156). — *Cyclosorus cumingianus* R. C. Ching, Bull. Fan. Mem. Inst. Bot. 10 (1941) 243. — Type: Cuming 1123 (K).

*Rhizome* decumbent to short-creeping, 3 to 4 mm. wide, bearing up to 10 closely set not articulated ( $\pm$  tufted) fronds, in transection irregular in outline due to the

attachment of leafbases; vascular cylinder dictyostelic, dissected by radially arranged fusiform leaf-gaps; meristeles varying from 3 to 4, mostly concentric, only rarely becoming bicollateral at certain levels; tracheids of the protoxylem with annular and annular-helical bands; those of the metaxylem with elongate to oval pits; fundamental tissue parenchymatous in the younger region but lignified in the central part of the older proximal end; epidermal cells approximately cubical in appearance, often bearing bases of scales. *Scales* apparently deciduous; from fragments observed length at least 2–3 mm., colour brownish. *Stipe* wiry, sulcate above, (2)4–8(10) cm. long and  $\varnothing$  not more than 0.5 mm., covered by branched, furcate or hooked hairs interspersed with glands and simple, aciculate hairs, indument especially prominent near base and above, becoming less thick when old; petiolar traces 2, hadrocentric, each resembling a hippocampus in cross section, and with 2 protoxylem groups in the inner face; all cells of the fundamental tissue except the hypodermal ones and the central sclerotic strand parenchymatous and thin-walled; aerenchymatous patches on either side of the petiolar base small. *Lamina* subdimorphous, coriaceous/papyraceous, lanceolate/linear (3) 6–10(12) cm. long, widest 0.8–1 cm. wide somewhat below the middle, narrowly attenuate to base and apex, fertile fronds (not all!) occasionally on longer stipes and with slightly narrower lamina; margin entire, straight or a little sinuous, cartilaginous and often recurved; costa prominent and angular below, apart from a few glands glabrous above and hairy (like stipe) below; venation clearly visible from below, less so from above, main veins sparingly forked with no more than 3 to 4 branches, lowest two branches of adjacent main veins (sometimes a higher pair as well) anastomosing, thus forming a row of pentagonal costal areoles, and also a single, outwardly orientated vein; where blade narrower near apex and base veins quite free; mesophyll of the leaf-lamina undifferentiated, densely chlorophyllous, thin-walled and with intercellular spaces; stomata evenly distributed and polycytic in nature; walls of the guard cells unevenly thickened, with ledges of cutinised wall material projecting over the external opening of the stomatal pore. *Sori* round in a fairly regular row nearer to costa than margin, placed on the veins, where blade widest some additional irregularly placed sori nearer to margin present; indusium reniform,  $\varnothing$  0.5 mm., firm and noncaducous, striate above, brown with a hyaline margin provided with prominent white spreading hairs  $\pm$  one third of indusium diameter long; capsule with 16–18 indurated cells; spores bilateral, monolete; sporoderm formed into definite wings; wings narrow, nearly membranous with crenate to fimbriate crests, anastomosing and folding over.

**Distribution:** Central America: Panama.

**Ecology:** As far as known along riverbanks.

**Notes:** The aberrant feature in *Goniopteris cumingiana* is the simple outline of the lamina without the formation of lobes or for that matter sinus membranes. It is this characteristic which prompted Kunze to write with his original description:

*'durch ungetheiltes Laub von sämtlichen bis jetzt bekannten Arten der Abteilung [Aspidium] verschieden'*.

and although for the *Aspidiceae* in the broad (unnatural) sense as adopted by Kunze this remark is no more appropriate, for *Goniopteris* it is still valid.

The pinnate (bipinnate, pinnatifid) groundplan of the leaves is so generally present in this family that one cannot but come to the conclusion that the simple lamina in *Goniopteris cumingiana* must be an extremely derived feature, perhaps



Fig. 1. *Goniopteris cumingiana*. — a. habit,  $\times 1\frac{1}{2}$ ; b. transection of rhizome,  $\times 36$ ; c. transection of petiole,  $\times 40$ ; d. stomata in surface view,  $\times 240$ . (Sc., sclerotic tissue; Vas., vascular tissue).

induced by its habitat, the species being apparently a rheophyte, in which the simplification of the blade is a common feature (see Van Steenis, in press).

Christensen already mentioned some *Goniopteris* ferns to be considered closely allied forms of *G. cumingiana*, viz. *Dryopteris francoana* (Fourn.) C. Chr. with simple lobed leaves and *D. skinneri* (Hook.) Kuntze of the same general outline but featuring a few free pinnae at the base. This would mean that the simple lamina of *G. cumingiana* is homologous with the entire blade of allied taxa.

It is tempting to regard the taxa with simple lamina occasionally present in other families of the leptosporangiate ferns, showing a common groundplan with more divided lamina, as having originated in the same way by parallel evolution as the blade of *Goniopteris cumingiana*. However, such a discussion would be premature and lead too far in this context. Similarly, whether the entire leaf so common in the *Polypodiaceae* indicates an advanced (apomorphic) character and therefore an advanced position of the family as a whole, is a matter of speculation at the present stage of research, but would concur with the conception as expressed in Dr. Jarret's recent publication (Kew Bull. 34, 4 (1980) 825–833) on the subject of the affinities of this family (and *Grammitidaceae*).

A few statements by Kunze in his original for that time excellent description of *G. cumingiana* need correction:

1. there are no hairs on the surface of the indusium,
2. the scales are not minute and not closely covering the rhizome at certain regions, as Kuntze mentions. What he probably saw are the bases of hairs covering the lower part of the petiole.